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ANCHORS AWAY – DOES ONE SIZE FIT ALL IN INFORMATION SYSTEMS CURRICULUM DEVELOPMENT?

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Abstract

There is much discord and contradiction in academia amongst those who teach on Information System Programmes. Much of the argument is based upon content and structure. This paper argues against having a static or singular centering, or anchoring, structure to an IS degree. Results from early report findings, based upon student feedback, suggest there is a need for an Information System curriculum to engage both students and industry as stakeholders. This engagement should ensure a relevant Programme once reflection and evaluation is considered on a continuous basis. Combined with a sound pedagogy, this continual reflection and regular industrial engagement will ensure relevant IS courses are being taught negating the need for a 'one size fits all' approach to IS education.

Keywords: Information Systems Degree, Curriculum Development.

1.0 Introduction

For years researchers have debated the content and structure of Information System (IS) degrees, deliberating what should be at the centre, or in which departments they should be based. Coady, Berg & Pooley (2012) suggest that there is no “one size fits all” IS curriculum and that whilst IS 2010 proposes a solid foundation of Core and Choice courses, there still needs to be a tailoring approach taken by Institutions in order to meet their specific requirements, budgetary issues and those specialisms peculiar to individual department(s). Firth et al (2011) state that one of the most crucial ideas behind a good IS degree is the design and delivery of excellent courses and curriculum. This idea has been further supported by Stefanidis and Fitzgerald (2010) who suggests that academics are charged with a responsibility of designing courses which are industry relevant whilst ensuring a strong pedagogy is embedded in the curriculum.

Lyytinen & King (2004) argue that the IS field has become preoccupied with this centre and propose that the real centre in the IS field will be solidified through a

market of ideas where scholars and practitioners exchange views regarding real world situations. The idea of centring /anchoring an IS degree is what this paper attempts to address, by investigating the various approaches suggested by researchers in the area at present, debating the key concepts involved and then posing a reflective analysis based on student opinion. Section 2 reviews related work and sets the scene for the studies reported here. Section 3 looks at the case for industrial engagement in curriculum development. Section 4 discusses the pedagogical soundness of teaching approaches in IS degrees with Section 5 defining the research approach to this study. The findings are reported in Section 6 and discussions presented in Section 7. Conclusions and future research is drawn out in Section 8.

2.0 Approaches

Often researchers in the field of IS debate the idea of centring the IS discipline, this is an argument that has been on-going for a number of years, this can be traced back to at least the first ICIS in 1980, and yet consensus still has to be reached. Lyytinen & King (2004) suggested that researchers had a desire to create a strong theoretical core at the centre of an IS degree. However they argue that the fundamental thinking behind this was invalid and proposed that to remain successful then the IS discipline needed intellectual discipline and the ability to span boundaries across a number of ideas concerning application of IT in human enterprise. They further argue that since there is no objectively determined definition of what IS theory is then any solution must depend on a widespread agreement of the field as to the interpretation of the term. DeSanctis (2003) proposed that the legitimacy of the IS field lies in the actions of people within organisations and how they pursue their scholarly work.

Klein and Hirschheim (2008) sought to shed some light on the reasoning behind the identity debate of the IS field, they argue that in order to move forward there needs to be a collective project of documenting the past from a multi-paradigm perspective in order to provide a coherent analysis of the analysis of the discipline.

Doyle & Schuff (2010) whilst posing a review of curriculums for IS degrees suggest that IS professionals must possess the skills to acquire and synthesize new information, and whilst technical literacy, systems analysis and databases are

important skills it has to be noted that these are by products of a larger set of problem solving skills. This expands on the theories suggested by Thomas et al (2007) who suggest that critical thinking and the ability to evaluate be at the centre of any modern IS degree. The ideas behind the pedagogical approaches are covered further in section 4.

IS 2010 is a model curriculum for IS degrees and has been derived and modified over the years by the Association of Computing Machinery (ACM) and other professional bodies from IS'97 and IS 2002. IS 2010 contained 4 main key differences from the previous IS 2002 curriculum, in such that it believed that application development be included as an optional element in IS curriculum, enterprise architecture and IT infrastructure be included whilst removing personal productivity tools and creating a more flattened curriculum, it then also questioned as to how periodic these reviews should be and how radical changes should be. However, whilst IS 2010 suggests seven core subjects and eleven options to support specialisations, it also emphasises the importance of tailoring IS programmes to meet local needs.

It is this idea of supporting local needs that is addressed in the next section. One of the key factors that most of these approaches seem to highlight is the need for stakeholder engagement in curriculum development and this paper supports the proposition that Industry should be seen as one of these key stakeholders.

3.0 Industrial Engagement

Zweig et al (2006) claimed that there was a perception of declining jobs in IS which was then questioned by Klein and Hirschheim (2008). Hirschheim and Newman (2010) addressed the issues of concern in Off-shoring of IS jobs and argued that this perceived action needed to be readdressed and overturned as the actuality of the situation is that IS jobs could never fully be offshored and there would always be a demand for IS jobs due to the diverse nature of graduates. There are robust figures showing that there are virtually as many IS jobs now as ever before, the public's perception appears to be at odds with this. Coady, Berg & Pooley (2012) supported this point with their, whilst small in number, evaluation of graduate employment statistics.

It is worth investigating the impact of Industrial Engagement on IS curriculum. It is the opinion of this author that an investigation of the skills required by Industry is imperative in order to ensure graduates of a degree Programme meet expectations. Stakeholder engagement is one of the key ideas in forming a disciplines identity (Scott and Lane 2000). Lightfoot (1999) identify industry as one of the four key stakeholder groups whose input influence curriculum in different ways. Industries will look at both soft and hard skills and ideally will seek graduates that require minimum training for positions within their industry. Stefanidis, Fitzgerald & Counsell (2013) suggest that whilst industry seeks graduates with more relevant skills it is often difficult to define exactly what these skills are and how they can be updated and integrated into a curriculum regularly. One proposition is that a snapshot of those skills be taken and compared to the programme and to realign any differences, this would need to be done on a regular basis, which it can be argued should be at the core of any sound curriculum. Doyle & Schuff (2012) suggest an IS department requires periodic tuning of curriculum content in order to be well aligned with industry and often incremental change is not enough. This may force researchers to rethink what it means to train an IS professional. Reflection and evaluation are seen as one of the important skills of an IS graduate, ergo they should also be part of any sound curriculum.

4.0 Employability

Whilst considerable amount of thought and research seems to have been given to the cornerstones of a sound curriculum, the pedagogical ideas behind it have, in a number of circumstances, been overlooked. Firth et al. (2011) developed six propositions as solutions for the perceived credibility crisis in the IS discipline. The most important of these was that the credibility of the discipline lies in the “design and delivery of excellent courses and curriculum”. This strengthens the case for the inclusion of pedagogical issues when thinking about curriculum development.

Doyle & Schuff (2012) suggest that for an IS department to be successful their curriculum must focus on both quality and innovation. They further challenge curriculum committees to examine traditional lecture / survey models for courses and look at a more diverse way of teaching such as inclusion of experimental components,

incorporating guest speakers, diversifying the methods of student engagement. This encourages students to critically think and evaluate for themselves, and this was one of the IS 2002 requirements. Scaffolding is one of the key ideas presented by Thomas, Davis & Kazlauskas (2007) as a method for creating an independent learner, which is ultimately one of the key employability skills this researcher feels is needed to be a true IS professional. Systems analysis has often been referred to as problem solving, and it is through these methods of scaffolding, reflection and evaluation students can use their experiences to deal with situations that may occur when in the real world that they have previously not encountered, almost like a case based reasoning scenario.

When considering how to improve curriculum design and considering the delivery of courses one of the ideas which is frequently debated is that of active learning. This term can mean different things to different educators however, in this instance; it is used to enable students to develop ideas, practice solving problems and to share ideas and learning. This builds on those ideas presented by Thomas, Davis & Kazlauskas (2007), Doyle & Schuff (2012) and others, and is one, this researcher feels, is crucial to have in a sound curriculum, almost irrespective of discipline.

5.0 Research Methodology

This paper presents the most recent results of a longitudinal study researching student employability statistics both before after being awarded an IS undergraduate degree from Heriot-Watt University. The research instrument chosen to carry out this study was a questionnaire, combined with a literature review (previously reviewed). Questionnaires are one of the most common implements in applied social research as testified by Glaser and Strauss (1967). In this case the questionnaire was distributed as a paper copy to students in the 3rd and 4th year of the IS degree Programme. The researcher, being involved in the teaching of said students, enabled easy access and assured anonymity. Analysis was aided by Excel spreadsheets which allow for the counting and recording of duplicated wording relationship associations on differing responses. Excel, along with being very transportable and robust, has excellent advanced tools that are more than sufficient to analyse the quantifiable data. Excel however, is not particularly efficient at analysing qualitative data. This was a study of

human worldviews, perceptions, emotions and attitudes thus requiring a pragmatic approach to analysis. Qualitative software such as Atlas and NVivo was seen as too limiting due to the multiple and varied response nature of this inquiry. Physically coding the responses has been effective with clusters, or themes, of opinion emerging from the process that would not have been apparent in any other form of investigation.

6.0 Findings

The questionnaires covered 3 main themes which were identified by the researcher as being important in an IS degree curriculum; industrial relevancy, pedagogical soundness and reflective evaluation. A total of twenty-six students responded from an enrolment of thirty-seven, with seventeen out of twenty-four 3rd years and nine out of thirteen 4th years.

6.1 Industrial Relevance

One of the key stakeholders, as previously stated, to consider when designing a curriculum is the local industry, or ultimately the employers of the graduates of the programme. Students were questioned as to their initial perceptions on the types of subjects they thought they might cover in an IS curriculum. This was following up on original work done by MacInnes (2010), who created a Soft Model of the HeriotWatt University IS Programme and reported on a survey of 31 potential IS students on student expectation of what an IS Programme would contain. This research of current year 3 & 4 cohort showed a commonality of opinion that an IS degree would contain courses such as Business Management (14), Programming (10) Marketing (6), Systems Analysis (6), Databases (5), and general InformationTechnology (IT) topics (5). Within the distribution group of the questionnaire it became apparent through analysis that the 4th year cohort seemed to have less comprehension / ideas of what an IS degree would contain with at least 3 students leaving the question blank which was in comparison to the 3rd year responses where every student gave at least one answer. This is further explored in the discussion section.

The questionnaire also asked what type of jobs students would think about applying for when they had finished their studies. Most popular responses across all cohorts were Business Systems Analyst (11), Project Manager (9) IT systems Analyst (7), IT

consultant (7), Banking/Finance (5). Some notable issues were a higher than anticipated response of Project Manager which appeared eight times in the 3rd year cohort. This could be rationalized due to a new topic being introduced to the year group whereas their 4th year counterparts had no formal Project Management training. Another issue worth noting is the appearance of “internet marketer” as a job title listed by 3rd years. Again this can be attributed to the introduction of a clear digital marketing and communications stream for this cohort. Surprisingly only one 4th year student of the entire respondents stated a job in Databases was something they would think about, this is despite being cited as useful by the students themselves, as discussed later in Section 6.3. Database is one of the core subjects taught on the current Programme and also recommended by IS2010.

6.2 Pedagogical Approaches

It is the opinion of these authors, as previously stated that there needs to be a sound pedagogical approach behind any curriculum in order to encourage student engagement and learning. Students were asked about the types of teaching styles they had encountered in their programme thus far. Students were given the list as detailed in Table 6.2.1 and the response counts are given.

Teaching Style	No. of Y responses	Teaching Style	No. of Y responses
Chalk and Talk	15	Self-Directed Learning	19
Interactive Learning	20	Directed Learning	18
Peer Learning	18	Labs/Tutorials	23
Group Discussions	21	Other	2

Table 6.2. 1 -- Number of Respondents by Teaching Style

One of the main ideas behind developing the Programme on which these students enrolled upon was to ensure there was a shift away from the traditional chalk and talk methods of teaching to a more active learning approach. The smallest number of Yes responses came under the Chalk and Talk Style and the most popular was Labs/Tutorials, which is unsurprising given this IS Programme is embedded in a Computer Science Department.

Students were also asked as to their preferred choices of teaching styles and reasoning behind their choice. The two most frequent preferred choices were Interactive Classes and Group Discussion/Work both coming in with 12 appearances. Some of the justification behind the choice of Group Discussion/Work included;

“I learn better in groups, it’s good to be able to express my opinion and learn from others”

Whilst another student felt

“working in groups gives me a better idea of what it will be like in the real world”.

The Group work method ties into the Interactive Learning as students felt it gave them a feeling of “Involvement” and “allowed an application of the knowledge”.

Self-directed learning and Labs/tutorials were the only other styles mentioned in more than one response with a total of four each. One student stated that Self-directed learning allowed them to

“take responsibility for my own learning and challenge myself to go further”

with another stating this type enabled

“me to create my own research to further understand topics that I may not first comprehend”.

6.3 Reflective Evaluation

As stated previously in the literature one of the key foundations of a sound curriculum is the ability to reflect and retune the curriculum at regular intervals. Questions were asked in the survey in regards to what students would change about the degree, what they felt most and least useful and also as to if they felt they were lacking any skills they believed an IS graduate should have.

When questioned about what changes students would like to see implemented there was a difference between year groups. The 3rd years highlighted their issues as the coursework/exam balance (3 students), looking at the ordering of certain courses pertaining to the 3rd year group project (4 students) and removal of networking/communications courses (5 students). The 4th years which were surveyed prioritized their request for change to include more technical / programming based

subjects, with these students highlighting a need for a more defined IS career path. Some felt the balance between Business subjects and Computer Science subjects was confusing at times.

One of the common sources of agreement between both year groups was the Group Project course. This is a course that involves students working on single project in a group of seven with Computer Science students and Software Engineering students playing the various roles that would occur in a Software Development Team. Software Design and Database Management were also perceived as useful to the students on a more technical side of things, whilst subjects such as Knowledge Management and Critical and Computational Thinking interested some, as people felt they could see *“real world applications of some of the theories described”* and could *“relate them to the position I’m currently working in”*.

A common source of discontentment between both year groups was the Internet and Communications course which students found too technical for IS students and felt it had no place in their programme. Students on the whole found few courses irrelevant apart from some of the management courses which students struggled with either due to a lack of interaction in classes or being able to see the relevance to their programme. Both of these issues will be discussed further in section 7.

7.0 Discussion

This section will further discuss the findings reported in Section 6 under the three key themes as identified through hand coding; Industrial Engagement, Pedagogical Soundness and Reflective Evaluation.

Landry et al (2000) suggest that a graduate of an IS Programme should be equipped to function adequately at an entry level position within industry and have a good basis for career development. This was, for this research, one of the cornerstones for questioning the students as to the career prospects they felt may be suitable at the end of their programme. Coady & Pooley (2008) highlight the importance of consulting local industry in order to ensure the relevant skills are being thought to students in order to provide well rounded relevant graduates. This concept was further supported

by Stefanidis and Fitzgerald (2010) who present the argument that academics should be given the responsibility of designing courses which are industry relevant. Graduate employability is one of the measurements of success in the National Student Survey (NSS) each year; therefore focus must be on ensuring students of a Programme are relevant for the Industrial Sector they expect to enter. The Programme running in the researcher's institution has the benefit of an Industrial Steering Panel (ISP) which is involved in a reflective discussion each year. The ISP contains industrial contacts the institution has either through virtue of research connections, alumni connections or they have employed graduates from our Programmes. One of the overwhelming strong points highlighted year on year by this panel is the 3rd year group project. The ISP believe that this project strengthens team working skills, project management skills, communication skills and interdisciplinary working skills amongst students, skills they believe are invaluable to any IS graduate. Whilst students may not necessarily be aware of what an IS programme may contain upon entry it is imperative they leave with a rounded set of skills suitable for the job market they intend to enter, which can only be achieved through Industrial Engagement.

Coady, Berg and Pooley (2012) state that quality teaching using creative pedagogic approaches is imperative for the student experience. Turner & Lowry (2005) suggest that a better calibre of graduate is created through the adoption of a more student-centred / active learning approach. This interactive learning was one of the favoured approaches of teaching styles that students reported in the questionnaire for this segment of the study. Some of the major complaints reported by students about courses they did not feel useful referred to teaching styles and the traditional chalk and talk structure having limited benefits in an IS curriculum which needed more real world examples and the ability to put into practice those theories covered. Students appreciated, found interesting and typically excelled in courses which were diverse in their nature of delivery, which goes to highlight the need for a sound pedagogical approach when designing an IS curriculum.

Reflection and Evaluation was the final theme created through the questionnaires. As highlighted previously by Doyle & Schuff (2012) IS departments requires periodic tuning of curriculum content in order to be well aligned with industry and often incremental change is not enough. As detailed in a previous study by Coady, Berg and

Pooley (2012) the core topic of Project Management as set out by IS 2010, whilst lacking in the original 2008 HeriotWatt University IS Programme, was to then be included in the revision of the Programme, this year this was by means of a number of lectures within a course as a stop gap measure. Future cohorts will have a whole course on Project Management delivered to them to replace the Internet and Communications course, as highlighted by the findings in Section 6.3, which is being withdrawn after much discussion and being made into a Computer Science only course. With Students and Industry being two of the key stakeholders in this Programme it is imperative their views are reflected in the curriculum content. A review on the management courses as delivered by our School of Management and Languages (SML) was also carried out and a more comprehensive stream of options in the marketing area of communications and digital marketing were included. This gives students who take these options a specific career path. Using reflection and evaluation of courses available and student opinion at regular intervals ensures that the IS programme is relevant for those stakeholders identified in this research.

8 Conclusions and further work

The objective of this research was to show that whilst disagreements continue to be made pertaining to IS curriculum development there are, however, core elements that require consideration.. Once there is a sound pedagogy, engagement with industry and a culture of engaging in reflective practice then a curriculum, which can be Institution specific, should produce well rounded graduates with high employability prospects. This was discussed in Section 7, looking at the three key themes identified by the research.

This research has engaged students as its primary stakeholder, having reported on the current literature of IS curriculum development. This research is part of a longitudinal study on IS Programme development at Heriot-Watt University which is in presently in its 5th year. The results presented here would suggest a natural progression for future work is to continue to engage with Industry and ensure the key skills defined in IS2010 or other frameworks for IS curriculums are still relevant.

Coady, Berg and Pooley (2012) propose the conclusion that there can be no “one size fits all” IS curriculum as and highlights a need for a tailoring approach to be taken. It is the conclusion of this paper that this tailoring, along with the three key themes identified - a sound pedagogy, engagement with industry and a culture of engaging in reflective practice, thus removes the need for the anchoring approach as debated by academics who continue to search for the elusive hole in the middle of the Polo Mint of IS curriculums.

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